II. Amendments to the Claims

This listing of claims replaces without prejudice all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A fluid treatment system for placement in a flanged pipe fluid conveyance system, the fluid treatment system comprising:

a flanged ductile iron pipe fitting comprising:

(a) a first flanged opening and a second flanged opening in substantial alignment to define a flow axis aligned substantially parallel to a direction of fluid flow through the first flanged opening and the second flanged opening; ~~and~~

(b) a third flanged opening;

(c) a removable radiation source module comprising a first flanged cover element configured to be removably coupled to said third flanged opening, the first flanged cover element having connected thereto at least two ~~one~~ radiation source ~~assembly~~ assemblies each comprising at least one elongate radiation source having a longitudinal axis substantially non-parallel ~~transverse~~ to the flow axis; and

(d) connecting structure configured to couple said first flanged cover element to said third flanged opening.

2. (Original) The fluid treatment system defined in claim 1, wherein the

first cover element is in substantially fluid tight sealing engagement with a flange portion of the third flanged opening.

3. (Original) The fluid treatment system defined in claim 1, wherein the first cover element cover comprises a radiation source opening through which the radiation source may be removably inserted into the flanged ductile iron pipe fitting.

4. (Original) The fluid treatment system defined in claim 1, wherein the first cover element further comprises a first support for supporting a proximal end of the radiation source assembly.

5. (Original) The fluid treatment system defined in claim 4, wherein the radiation source assembly is cantilevered with respect to the first support.

6. (Original) The fluid treatment system defined in claim 1, wherein the flanged ductile iron pipe fitting further comprises a fourth flanged opening in substantial alignment with the third flanged opening to define a cross-flow axis substantially transverse to the flow axis.

7. (Original) The fluid treatment system defined in claim 6, wherein the fourth flanged opening comprises a second cover element.

8. (Original) The fluid treatment system defined in claim 7, wherein the

second cover element is in substantially fluid tight sealing engagement with a flange portion of the fourth flanged opening.

9. (Original) The fluid treatment system defined in claim 7, wherein the second cover element further comprises a second support for supporting a distal end of the radiation source assembly.

10. (Original) The fluid treatment system defined in claim 9, wherein the second support comprises a receptacle for receiving the distal end of the radiation source assembly.

11. (Original) The fluid treatment system defined in claim 1, wherein the longitudinal axis of the radiation source is substantially orthogonal to the direction of the flow axis.

12. (Original) The fluid treatment system defined in claim 1, wherein the first cover element has connected thereto a plurality of radiation source assemblies.

13. (Original) The fluid treatment system defined in claim 1, further comprising a cleaning device for removing fouling materials from a surface of the radiation source assembly.

14. (Original) The fluid treatment system defined in claim 13, wherein

the cleaning device comprises a cleaning sleeve in contact with an exterior surface of the radiation source assembly.

15. (Original) The fluid treatment system defined in claim 14, wherein the cleaning sleeve comprises a mechanical wiper.

16. (Original) The fluid treatment system defined in claim 15, wherein the mechanical wiper comprises an O-ring.

17. (Original) The fluid treatment system defined in claim 15, wherein the mechanical wiper comprises a mechanical brush.

18. (Original) The fluid treatment system defined in claim 15, wherein the mechanical wiper comprises a cellular material.

19. (Original) The fluid treatment system defined in claim 14, wherein the cleaning sleeve comprises a chamber for receiving a cleaning fluid.

20. (Original) The fluid treatment system defined in claim 19, wherein the chamber comprises a mechanical cleaning element.

21. (Original) The fluid treatment system defined in claim 20, wherein the mechanical cleaning element comprises a porous material.

22. (Original) The fluid treatment system defined in claim 20, wherein the mechanical cleaning element comprises a cellular material.

23. (Original) The fluid treatment system defined in claim 1, wherein the first flanged opening comprises a diameter in the range of from about 3 inches to about 64 inches.

24. (Original) The fluid treatment system defined in claim 1, wherein the second flanged opening comprises a diameter in the range of from about 3 inches to about 64 inches.

25. (Original) The fluid treatment system defined in claim 1, wherein the third flanged opening comprises a diameter in the range of from about 3 inches to about 64 inches.

26. (Original) The fluid treatment system defined in claim 1, wherein each of the first flanged opening, the second flanged opening and the third flanged opening comprises substantially the same diameter.

27. (Original) The fluid treatment system defined in claim 1, wherein: (i) the first flanged opening and the second flanged opening comprise substantially the same diameter, and (ii) the third flanged opening has a different diameter than the first flanged

opening and the second flanged opening.

28. (Original) The fluid treatment system defined in claim 1, wherein the radiation source comprises an ultraviolet radiation source.

29. (Original) The fluid treatment system defined in claim 1, wherein the at least one radiation source assembly further comprises a protective sleeve surrounding the at least one elongate radiation source.

30. (Original) The fluid treatment system defined in claim 1, wherein the first cover element comprises a plurality of radiation source assemblies, each radiation source assembly comprising at least one elongate radiation source.

31. (Currently Amended) A method of installing a fluid treatment system in an existing piped fluid conveyance system, the method comprising the steps of:

(a) extracting a section of pipe from the existing piped fluid conveyance system to define a flanged fluid intake and a flanged fluid feed [[e]];

(b) disposing a flanged ductile iron pipe fitting between the flanged fluid intake and the flanged fluid feed, the flanged ductile iron pipe fitting comprising:

(i) a first flanged opening and a second flanged opening in substantial alignment to define a flow axis aligned substantially parallel to a direction of fluid flow through the first opening and the second opening; ~~and~~

(ii) a third flanged opening;

(iii) a removable radiation source module comprising a first flanged cover element configured to be removably coupled to said third flanged opening, the first flanged cover element having connected thereto at least two ~~one~~ radiation source ~~assembly~~ assemblies each comprising at least one elongate radiation source having a longitudinal axis substantially non-parallel ~~transverse~~ to the flow axis; ; and

(iv) connecting structure configured to couple said first flanged cover element to said third flanged opening

(c) connecting the first flanged opening to the flanged fluid intake in a substantially fluid tight manner; and

(d) connecting the second flanged opening to the flanged fluid feed in a substantially fluid tight manner.

32. (Original) The method defined in claim 31, wherein the first cover element is in substantially fluid tight sealing engagement with a flange portion of the third flanged opening.

33. (Original) The method defined in claim 31, wherein the first cover element comprises a radiation source opening through which the radiation source may be removably inserted into the flanged ductile iron pipe fitting.

34. (Original) The method defined in claim 31, wherein the first cover element further comprises a first support for supporting a proximal end of the radiation source assembly.

35. (Original) The method defined in claim 34, wherein the radiation source assembly is cantilevered with respect to the first support.

36. (Original) The method defined in claim fluid treatment system defined in claim 31, wherein the flanged ductile iron pipe fitting further comprises a fourth flanged opening in substantial alignment with the third flanged opening to define a cross-flow axis substantially transverse to the flow axis.

37. (Original) The method defined in claim 36, wherein the fourth flanged opening comprises a second cover element.

38. (Original) The method defined in claim 37, wherein the second cover element is in substantially fluid tight sealing engagement with a flange portion of the fourth flanged opening.

39. (Original) The fluid treatment system defined in claim 37, wherein the second cover element further comprises a second support for supporting a distal end of the radiation source assembly.

40. (Original) The method defined in claim 39, wherein the second support comprises a receptacle for receiving the distal end of the radiation source assembly.

41. (Original) The method defined in claim 31, wherein the longitudinal axis of the radiation source is substantially orthogonal to the direction of the flow axis.

42. (Original) The method defined in claim 31, wherein the first cover element has connected thereto a plurality of radiation source assemblies.

43. (Original) The method defined in claim 31, further comprising a cleaning device for removing fouling materials from a surface of the radiation source assembly.

44. (Original) The method defined in claim 43, wherein the cleaning device comprises a cleaning sleeve in contact with an exterior surface of the radiation source assembly.

45. (Original) The method defined in claim 44, wherein the cleaning sleeve comprises a mechanical wiper.

46. (Original) The method defined in claim 45, wherein the mechanical wiper comprises an O-ring.

47. (Original) The method defined in claim 45, wherein the mechanical wiper comprises a mechanical brush.

48. (Original) The method defined in claim 45, wherein the mechanical wiper comprises a cellular material.

49. (Original) The method defined in claim 44, wherein the cleaning sleeve comprises a chamber for receiving a cleaning fluid.

50. (Original) The method defined in claim 49, wherein the chamber comprises a mechanical cleaning element.

51. (Original) The method defined in claim 50, wherein the mechanical cleaning element comprises a porous material.

52. (Original) The method defined in claim 50, wherein the mechanical cleaning element comprises a cellular material.

53. (Original) The method defined in claim 31, wherein the first flanged opening comprises a diameter in the range of from about 3 inches to about 64 inches.

54. (Original) The method defined in claim 31, wherein the second flanged opening comprises a diameter in the range of from about 3 inches to about 64 inches.

55. (Original) The method defined in claim 31, wherein the third flanged opening comprises a diameter in the range of from about 3 inches to about 64 inches.

56. (Original) The method defined in claim 31, wherein each of the first flanged opening, the second flanged opening and the third flanged opening comprises substantially the same diameter.

57. (Original) The method defined in claim 31, wherein the radiation source comprises an ultraviolet radiation source.

58. (Original) The method defined in claim 31, wherein the at least one radiation source assembly further comprises a protective sleeve surrounding the at least one elongate radiation source.

59. (Original) The method defined in claim 31, wherein the first cover element comprises a plurality of radiation source assemblies, each radiation source assembly comprising at least one elongate radiation source.

60. (Currently Amended) A fluid treatment system for placement in a flanged pipe fluid conveyance system, the fluid treatment system comprising:

a flanged ductile iron ~~non-metallic~~ pipe fitting comprising:

(a) a cylindrical ductile iron housing;

(b) a first flanged opening and a second flanged opening in substantial alignment to define a flow axis aligned substantially parallel to a direction of fluid flow through the first opening and the second opening; ~~and~~

(c) ~~(b)~~ a third flanged opening;

(d) a removable radiation source module comprising a first cover element adapted to be removably coupled to said third flanged opening, the first cover element having connected thereto at least two ~~one radiation source assembly comprising at least one~~ elongate radiation ~~source~~ sources each having a longitudinal axis substantially transverse to the flow axis, distal ends of said at least two elongate radiation sources being disposed within said cylindrical ductile iron housing.

61. (New) The fluid treatment system defined in claim 60, wherein the first cover element is in substantially fluid tight sealing engagement with a flange portion of the third flanged opening.

62. (New) The fluid treatment system defined in claim 60, wherein the first cover element cover comprises a radiation source opening through which the radiation source may be removably inserted into the flanged ductile iron pipe fitting.

63. (New) The fluid treatment system defined in claim 60, wherein the first cover element further comprises a first support for supporting a proximal end of the radiation source assembly.

64. (New) The fluid treatment system defined in claim 63, wherein the radiation source assembly is cantilevered with respect to the first support.

65. (New) The fluid treatment system defined in claim 60, further comprising connecting structure configured to couple said first flanged cover element to said third flanged opening.

66. (New) The fluid treatment system defined in claim 65, wherein said connecting structure comprises at least one bolt.

67. (New) The fluid treatment system defined in claim 1, wherein said connecting structure comprises at least one bolt.

68. (New) A water treatment radiation source module, comprising:

a flanged cover plate configured to be removably coupled to a water pipe flanged opening;

two radiation source modules cantilever-mounted to an inside surface of said flanged cover plate so that said radiation source modules and the flanged cover plate are configured to provide a radiation zone inside the water pipe, each radiation source module comprising a radiation source disposed inside of a protective sleeve, said radiation source modules being configured to be disposed non-parallel to a direction of fluid flow inside the water pipe;

at least one connection aperture in said flanged cover plate and configured to provide electrical connection to said two radiation source modules; and

connecting structure configured to couple said flanged cover plate to said water pipe flanged opening.

69. (New) A water treatment radiation source module according to Claim 68, further comprising:

first and second cleaning devices, respectively configured to clean the two radiation source module protective sleeves;

cleaning device support structure coupled to said first and second cleaning devices and configured to move the first and second cleaning devices along the two radiation source module protective sleeves, a portion of said cleaning device support structure being the cantilever-mounted to the inside surface of said flanged cover plate; and

cleaning device drive structure coupled to an outside surface of the flanged cover plate and configured to drive said cleaning device support structure to cause the movement of the first and second cleaning devices along the two radiation source module protective sleeves.

70. (New) A water treatment radiation source module according to Claim 69, further comprising a cleaning device drive structure aperture in said flanged cover plate.

71. (New) A water treatment radiation source module according to Claim 68, wherein said a flanged cover plate comprises a round, ductile iron cover plate configured to be bolted to a standard water pipe flanged opening.